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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/539,458
Filing Date: March 30, 2000
Appellant(s): CHANG ET AL.

MAILED

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Robert A. Voigt, Jr.
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 6, 2005 appealing from the
Office action mailed November 10, 2004.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on February 11, 2005 has been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

5,939,753

Ma et al.

8-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 17, and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al. [U.S. Pat. 6,197,639].

With respect to claim 1, Lee et al. (fig. 12, cols. 2-5) discloses a flash memory device comprising:

a plurality of gate stacks including a plurality of floating gates (57a) and a plurality of control gates (63a) disposed on a semiconductor substrate (51);

at least one component (57, 63) including a polysilicon layer having a top surface, wherein the at least one component (57, 63) is formed on a field oxide region (53) configured to separate the plurality of gate stacks;

a silicide (65a) on the top surface of the polysilicon layer of the at least one component (57, 63); and

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an insulating layer (81) covering the plurality of gate stacks, the at least one component and the silicide, the insulating layer having a plurality of contact holes (85, 87, 91) therein.

With respect to claim 17, Lee et al. (fig. 12, cols. 2-5) discloses a flash memory device comprising:

- a gate insulating layer (55);

- a gate stack formed on the insulating layer, wherein the gate stack comprises:

- a first floating gate (57a);

- an insulating layer (58a) formed on the first floating gate (57a); and

- a second polysilicon layer (63a) formed on the insulating layer.

- a field oxide region (53) located adjacent to the gate insulating layer;

- a component (57, 63) located on the field oxide region (53), wherein the component (57, 63) is formed from one of the first and the second polysilicon layer; and

- a silicide layer (65a) formed on the component.

With respect to claim 18, Lee et al. discloses that the silicide layer (65a) prevents etching through the polysilicon layer (63) (see fig. 10).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

5. Claims 2, 3, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. [U.S. Pat. 6,197,639] in view of Ma et al. [U.S. Pat. 5,939,753].

Lee et al. discloses all the limitation as claimed above including the silicide specifically including tungsten silicide. Lee et al. does not specifically state that the silicide is titanium silicide or cobalt silicide. However, Ma et al. discloses that the silicide layer (108, 109) formed on the polysilicon (58) can be formed of tungsten silicide, molybdenum silicide, titanium silicide or cobalt silicide (see col. 7, lines 48-49 and col. 8, lines 1-7). Therefore, it would have been obvious to one of ordinary skill in the art at to select either titanium silicide or cobalt silicide as the gate on the component in the device of Lee et al. because as taught by Ma et al., such materials are equivalence for their use in the semiconductor art as to form a dual-layer structure with low resistance, which is made up of a polysilicon and metal silicide.

Allowable Subject Matter

6. Claim 21 is allowed.

(10) Response to Argument

A. Claims 1, 17 and 18 are not properly rejected under 35 U.S.C. 102(e) as being anticipated by Lee.

1. Claim 1 is not anticipated by Lee.

- Appellants argue that Lee does not disclose "at least one component including a polysilicon layer having a top surface, wherein the at least one component is formed on a field oxide region configured to separate the plurality of gate stacks".

This argument is not persuasive because Lee clearly discloses at least one component (57, 63) including a polysilicon layer having a top surface, wherein the at least one component (57, 63) is formed on a field oxide region (53) configured to separate the plurality of gate stacks (57a, 63a)(see fig. 12 and col. 3, lines 40-67).

- Appellants argue that "There is no language in Lee that discloses that polysilicon layers 57, 63 are a component".

This argument is not persuasive because Appellants do not specify the "component". "component" is given its broadest reasonable interpretation in the context of the appealed claims. Therefore, Lee meets and anticipates the claim language.

- Appellants argue that Lee does not disclose "a silicide on the top surface of the polysilicon layer of the at least one component".

This argument is not persuasive because Lee clearly discloses a silicide (65a) on the top surface of the polysilicon layer of the at least one component (57, 63) (see fig. 12 and col. 3, lines 66-67).

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- Appellants argue that Lee does not disclose "an insulating layer covering the plurality of gate stacks, the at least one component and the silicide, the insulating layer having a plurality of contact holes therein."

This argument is not persuasive because Lee clearly discloses an insulating layer (81) covering the plurality of gate stacks, the at least one component (57, 63) and the silicide (65a), the insulating layer having a plurality of contact holes (85, 87, 91) therein (see figs. 8-10 and col. 4, lines 49-67; col. 5, lines 17-22).

2. Claims 17 and 18 are not anticipated by Lee.

- Appellants argue that Lee does not disclose "a component located on said field oxide region, wherein said component is formed from one of said first and said second polysilicon layer".

This argument is not persuasive because Lee clearly discloses a component (57, 63) located on the field oxide region (53), wherein the component (57, 63) is formed from one of the first and the second polysilicon layer (see fig. 12 and col. 3, lines 40-67).

- Appellants argue that claim 17 recites both a gate stack and a component. Under the rule of claim differentiation, a gate stack may not be interpreted as a component. Furthermore, the gate stack is not formed from one of the first and second polysilicon layers, as required by claim 17, but from both of the first and second polysilicon layers.

This argument is not persuasive because Lee clearly discloses that the gate stack (57a, 63a) is formed on the cell array region and the layer (57, 63) is formed on the field oxide (53) (see fig. 12). The gate stack (57a, 63a) comprises a floating gate and a control gate of a flash memory and the layer (57, 63) is a word line. Since they are formed on different locations they serve different functions. Therefore, the layer (57, 63) can be interpreted as a "component". Turning now to the Appellants argument that the gate stack is not formed from one of the first and second polysilicon layers, it is noted that the claim language of "wherein said component is formed **from one of** said first and said second polysilicon layer" does not limit the component formed to **only** one of the first or second polysilicon layer. Therefore, Lee meets and anticipates the claim language.

- Appellants argue that Lee does not disclose "a silicide layer formed on said component".

This argument is not persuasive because Lee clearly discloses a silicide layer (65a) formed on said component (57, 63) (see fig. 12 and col. 3, lines 66-67).

B. Claims 2, 3, 19 and 20 are not properly rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Ma.

1. The Examiner has not presented a source of motivation for modifying Lee with Ma.

- Appellants argue that the motivation to modify Lee with Ma must come from one of three possible sources: the nature of the problem to be solved, the

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teachings of the prior art, and the knowledge of persons of ordinary skill in the art. In re Roulet, 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998). The Examiner has not provided any evidence that his motivation comes from any of these sources. Instead, the Examiner is relying upon his own subjective opinion which is insufficient to support a prima facie case of obviousness. In re Lee, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Consequently, the Examiner's motivation is insufficient to support a prima facie case of obviousness for rejecting claims 2, 3, 19 and 20. *Id.*

This argument is not persuasive because the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Lee et al. discloses that the silicide layer (65) is tungsten silicide. Lee et al. does not disclose that the silicide is specifically titanium silicide or cobalt silicide. However, Ma et al. discloses that the silicide layer (108, 109) formed on the polysilicon (58) can be formed of tungsten silicide, molybdenum silicide, titanium silicide or cobalt silicide (see col. 7, lines 48-49 and col. 8, lines 1-7). Therefore, it would have been obvious to one of ordinary skill in the art at to select either titanium silicide or cobalt silicide as the silicide component in the device of Lee et al. because, as taught by Ma et al., such materials are equivalent for their use in the semiconductor art as to form a dual-layer structure of a polysilicon and metal silicide which provides low resistance.

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2. By modifying Lee with Ma, the principle of operation of Lee would change.

- Appellants argue that by combining Lee with Ma, Lee would no longer be able to reduce etching damage as the silicide layer pattern 65a would no longer cover the entire second polysilicide layer 63a because Ma teaches that the silicide covers portions of a polysilicon resistor. Hence, by combining Lee with Ma, the silicide layer 65a in Lee would no longer cover the entire polysilicide layer 63a but only portions of the second polysilicide layer 63a. By modifying Lee so that the silicide layer 65a covers portions of the second polysilicide layer 63a, Lee would not be able to reduce etching damage, which is the principle of operation of Lee.

This argument is not persuasive because the rejection of the invention as claimed is not based on anticipated, but rather, is based on obviousness. Thus Appellant's arguments are arguments against the references individually but not proper arguments where references are applied in combination. It is noted that, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller* 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, the teaching of Ma specifically showing the equivalence of tungsten silicide, titanium silicide and cobalt silicide provides sufficient motivation to one of ordinary skill to replace titanium silicide of Lee with titanium silicide and cobalt silicide of Ma. Lee discloses that a tungsten silicide layer (65) is formed on the entire second polysilicide

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layer 63a (see fig. 6 and col. 3, lines 65-67). Ma et al. discloses that the silicide layer (108, 109) formed on the polysilicon (58) can be formed of **tungsten silicide**, molybdenum silicide, **titanium silicide** or **cobalt silicide** (see col. 7, lines 48-49 and col. 8, lines 1-7). Therefore, it would have been obvious to one of ordinary skill in the art at to select either titanium silicide or cobalt silicide as the specific component material in the device of Lee et al. because as taught by Ma et al., such materials are equivalent for their use in the semiconductor art as to form a dual-layer structure with low resistance.

3. The Examiner has not presented any objective evidence for modifying Lee with Ma.

- Appellants argue that titanium silicide or cobalt silicide are equivalent materials does not address as to why one of ordinary skill in the art would modify Lee with Ma such that the silicide layer (silicide layer pattern 65a), as taught in Lee, which may include titanium or cobalt silicide, would cover a portion and not the entire polysilicide layer 63a since Ma teaches silicide regions that cover portions of polysilicon resistor 58. The Examiner must provide a suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art to modify the silicide layer (silicide layer pattern 65a), as taught in Lee, which may include titanium or cobalt silicide, to cover only a portion and not the entire polysilicide layer 63a. M.P.E.P. §2143. As the Examiner has not provided such motivation, but instead relies upon his own subjective opinion, the Examiner has not presented a prima facie

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case of obviousness in rejecting claims 2, 3, 19 and 20. In re Lee, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002),. M.P.E.P. §2143.

This argument has been addressed above section B 1-2. Furthermore, Ma is relied upon for the silicide materials, not for the shape or structure of the silicide material.

4. The Examiner has not presented a reasonable expectation of success when combining Lee with Ma.

- Appellants argue that the Examiner has not presented any evidence that there would be a reasonable expectation of success in combining Lee, that relates to a NOR flash memory device with reduced etching damage, with Ma, that relates to a monolithic integrated circuit that performs both radio frequency analog circuit and digital circuit functions. The Examiner must provide objective evidence as to how a NOR flash memory device with reduced etching damage would be combined with a monolithic integrated circuit that performs both radio frequency analog circuit and digital circuit functions. M.P.E.P. §2143.02. The Examiner must present a reasonable expectation of success in combining Lee with Ma in order to establish a prima facie case of obviousness. M.P.E.P. §2143.02.

This argument is not persuasive because in Lee and Ma the silicide material performs the same function, i.e. electrode contact to the gate of a field effect transistor.

In conclusion, the Examiner thus regards Appellants' assertions as constituting evidence that Appellants have failed to consider as a whole the prior art teachings

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disclosed by the combining of the references.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

HP
September 22, 2005

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